JOHANN WOLFGANG GOETHE
UNIVERSITÄT
FRANKFURT AM MAIN

www.uni-frankfurt.de

Influence of different boundary conditions on the market for scientific information

B. Dugall

5th Frankfurt Symposium October 2005

Preliminary remarks

2001 – 2003 research project (grant of DFG)

Analysis of usage patterns in electronic journals

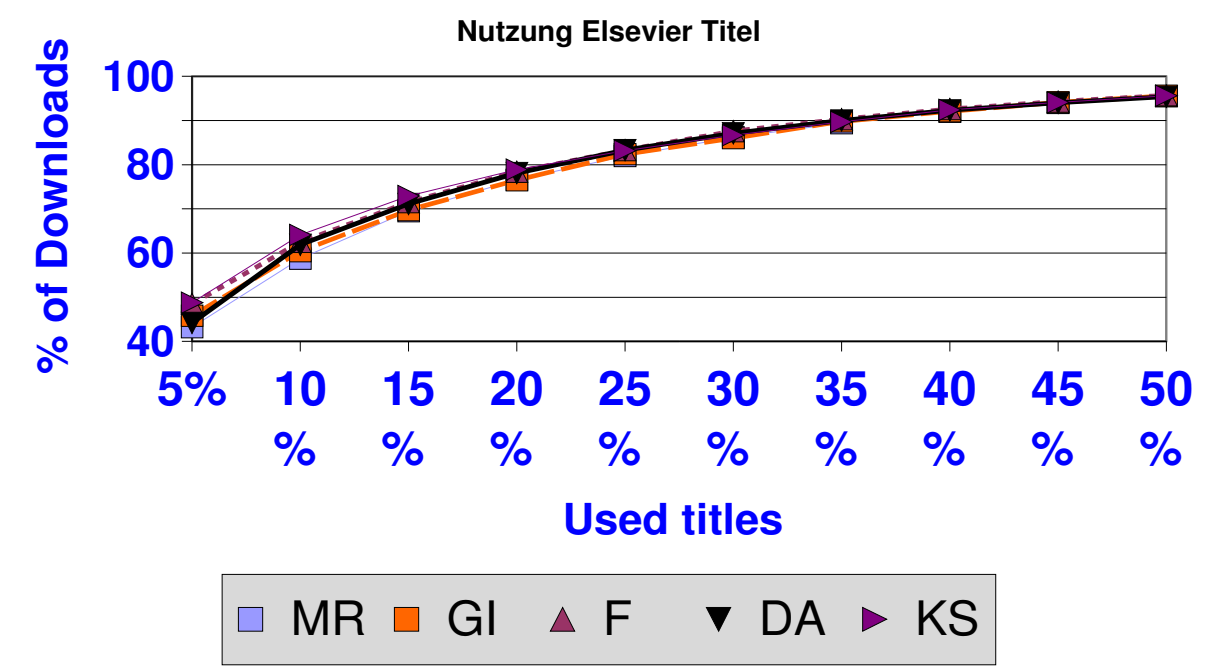
Development of optimal cost models (for consortia)

Classification of different types of „open access“ activities

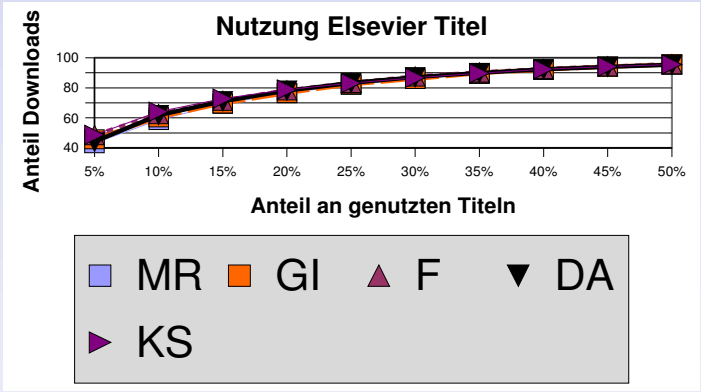
Usage patterns: main results

- **Usage patterns will not vary by publisher or discipline**
- **Usage patterns will not change over time (4 year period)**
- **Total usage varies strongly between different disciplines**
- **Cost/usage is scattering widely**

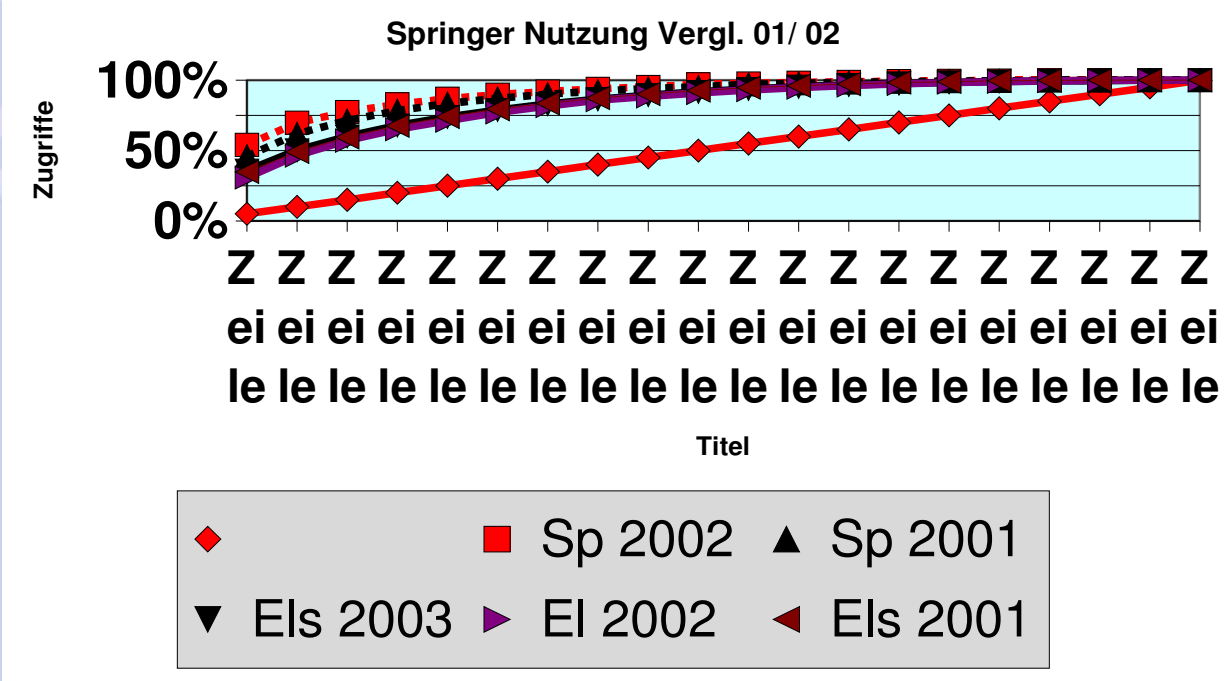
Usage spread over different universities



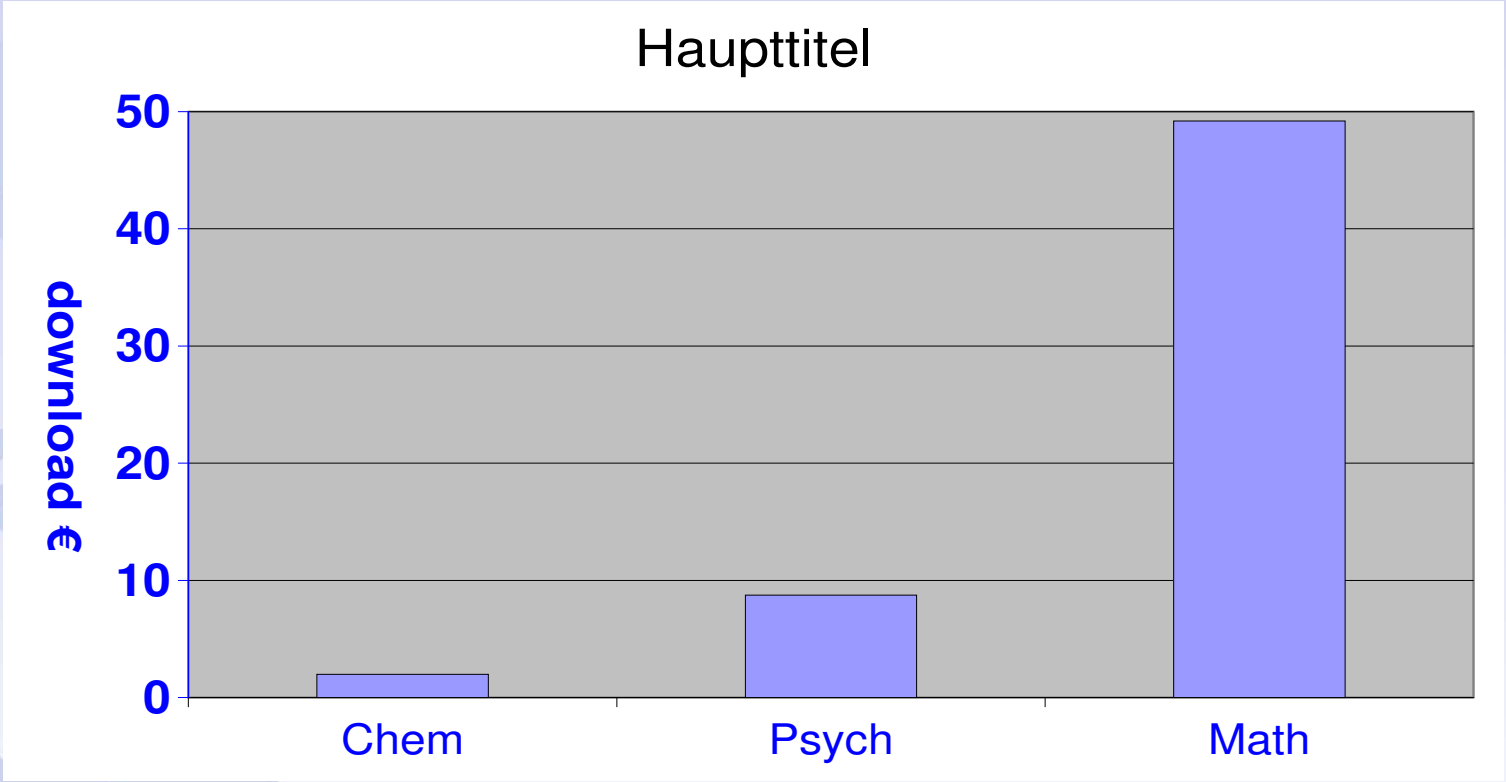
Usage of different publisher packages



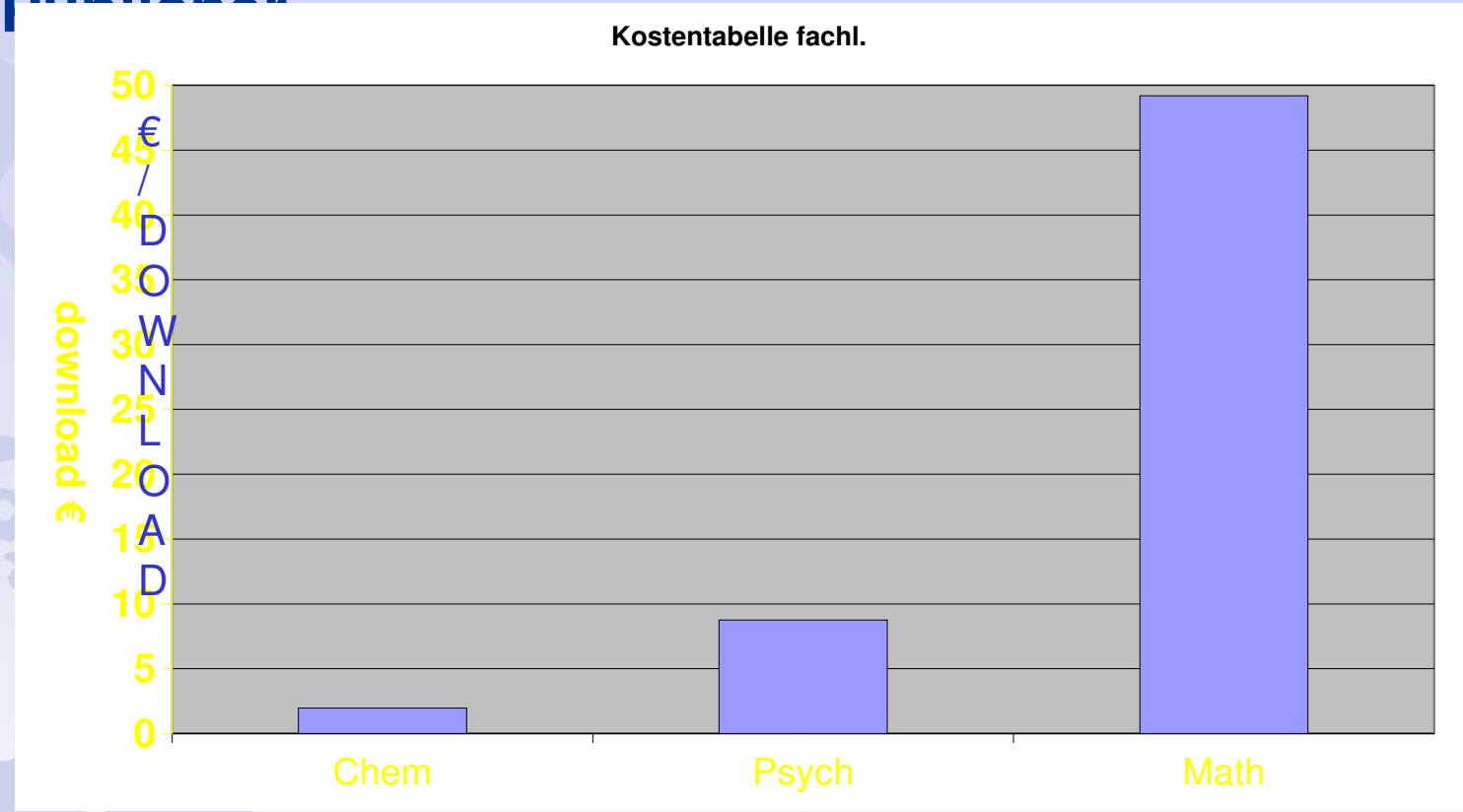
Usage over time period



Costs / Discipline



Costs / Discipline / Publisher



New Project (DFG Grant)

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Scientific Information and Alternative Price Building Mechanisms (Objectives)

Description and comparability of different publication patterns from an economic view

Development of simulation models (based on game theory) to describe the market behaviour including individual incentives of the participants

Evaluation of alternative publication forms related to their economic efficiency

New Project (DFG Grant)

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Scientific Publishing and Alternative Pricing Mechanisms

Analysis of relevant influence factors

Explanation and predictability of decisions of different actors

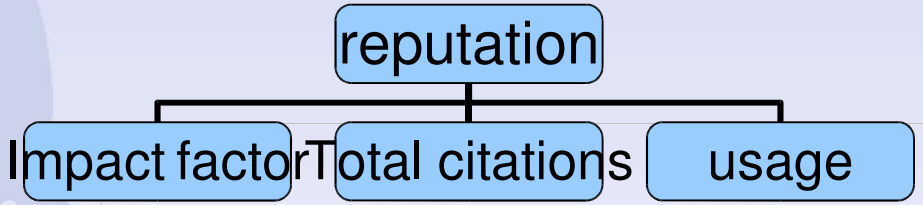
Selection and evaluation of efficiency measures for information markets

Development of a simulation model

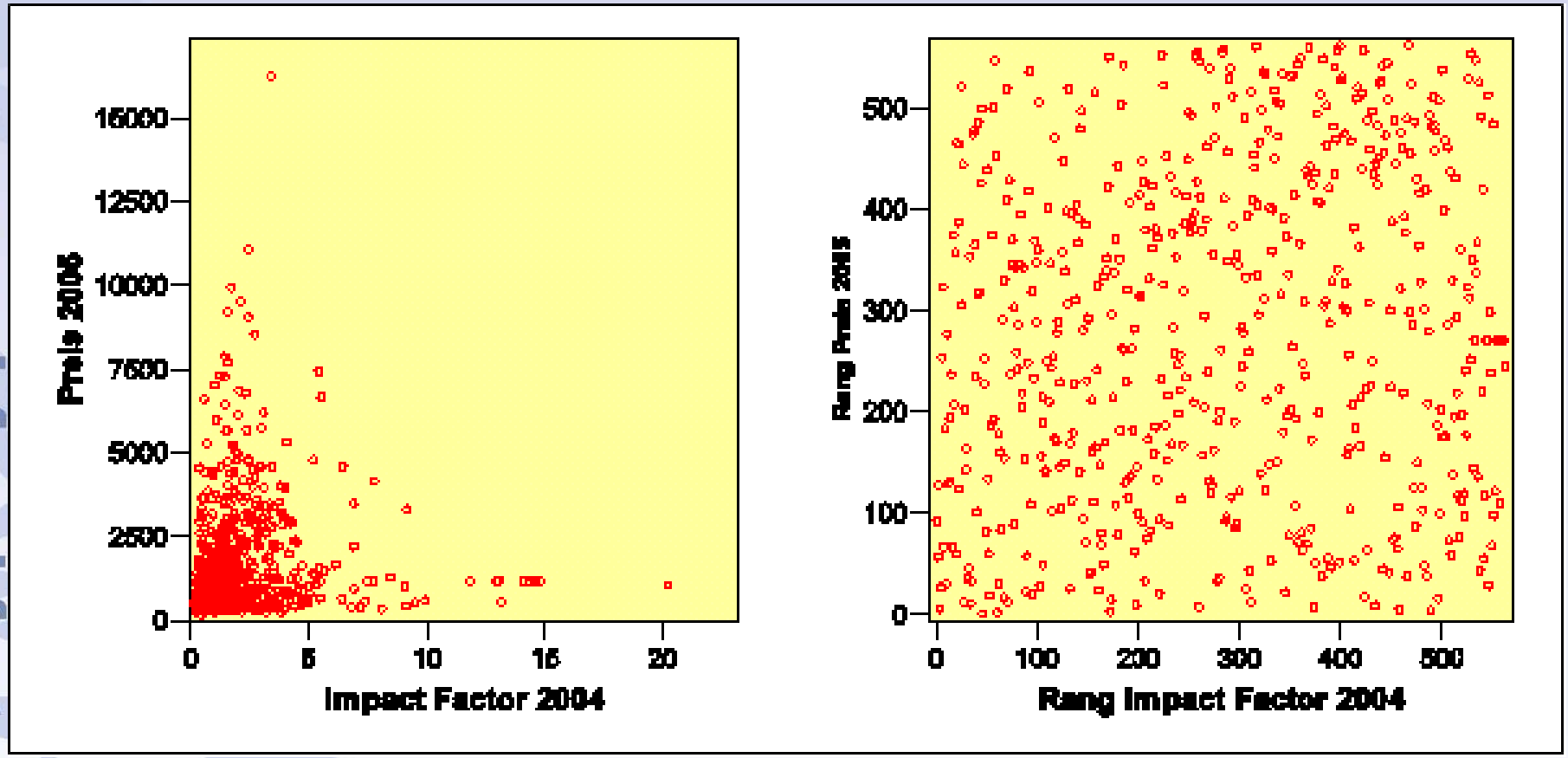
Predictability and evaluation of market changes

Determinants of journal pricing

Is there any correlation between price and reputation?

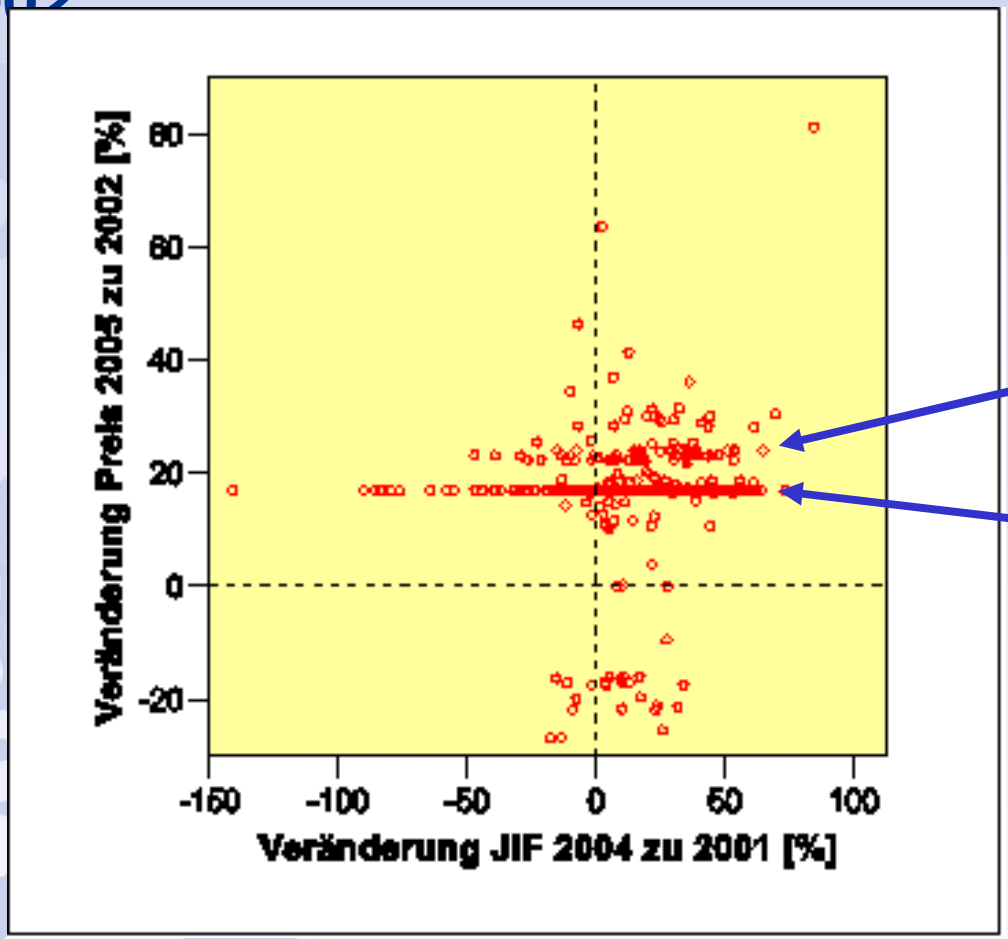


Impact Factor and Price



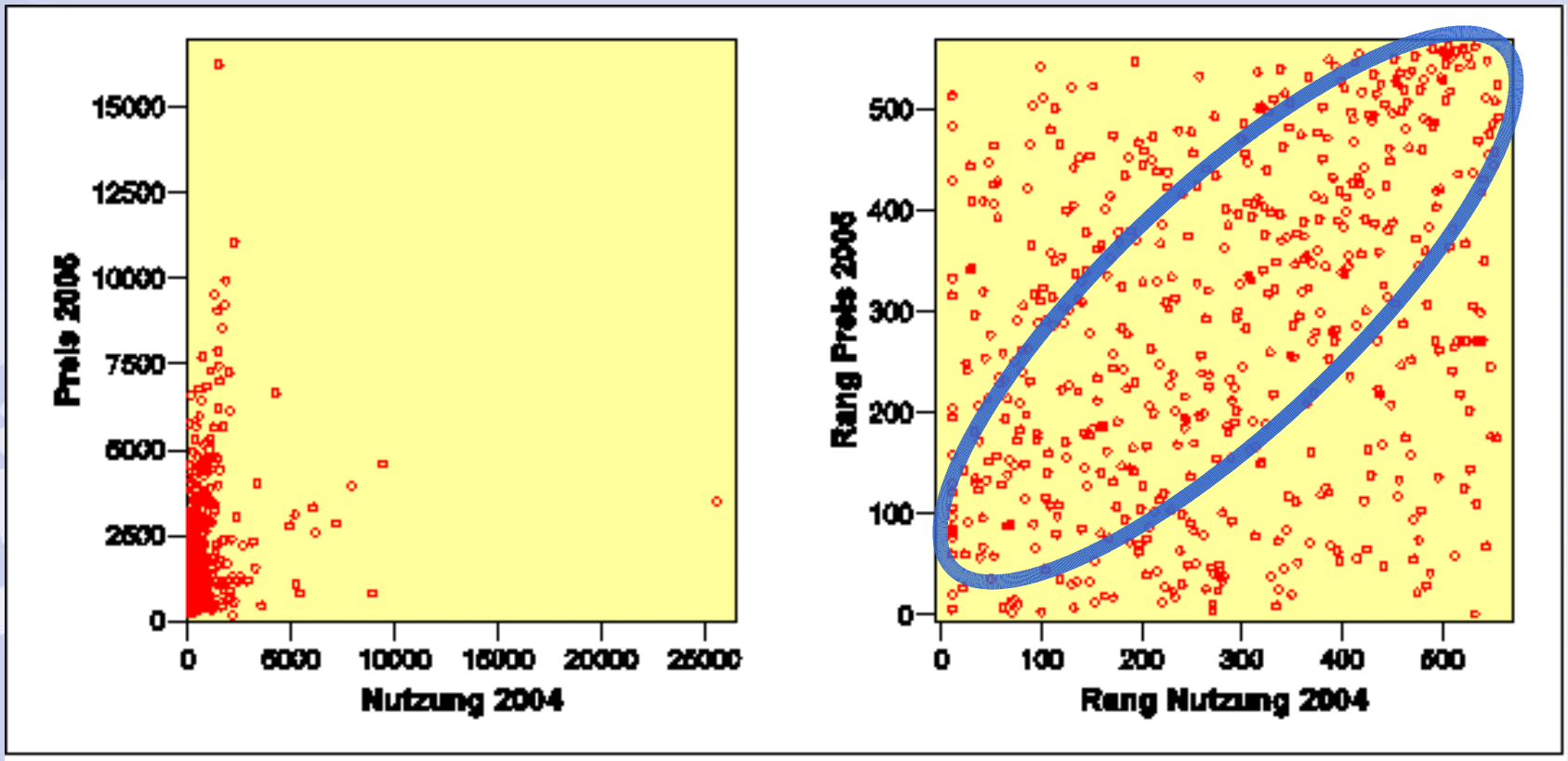
N = 583 Mean = 2.225

Changes in price between 2005 and 2002

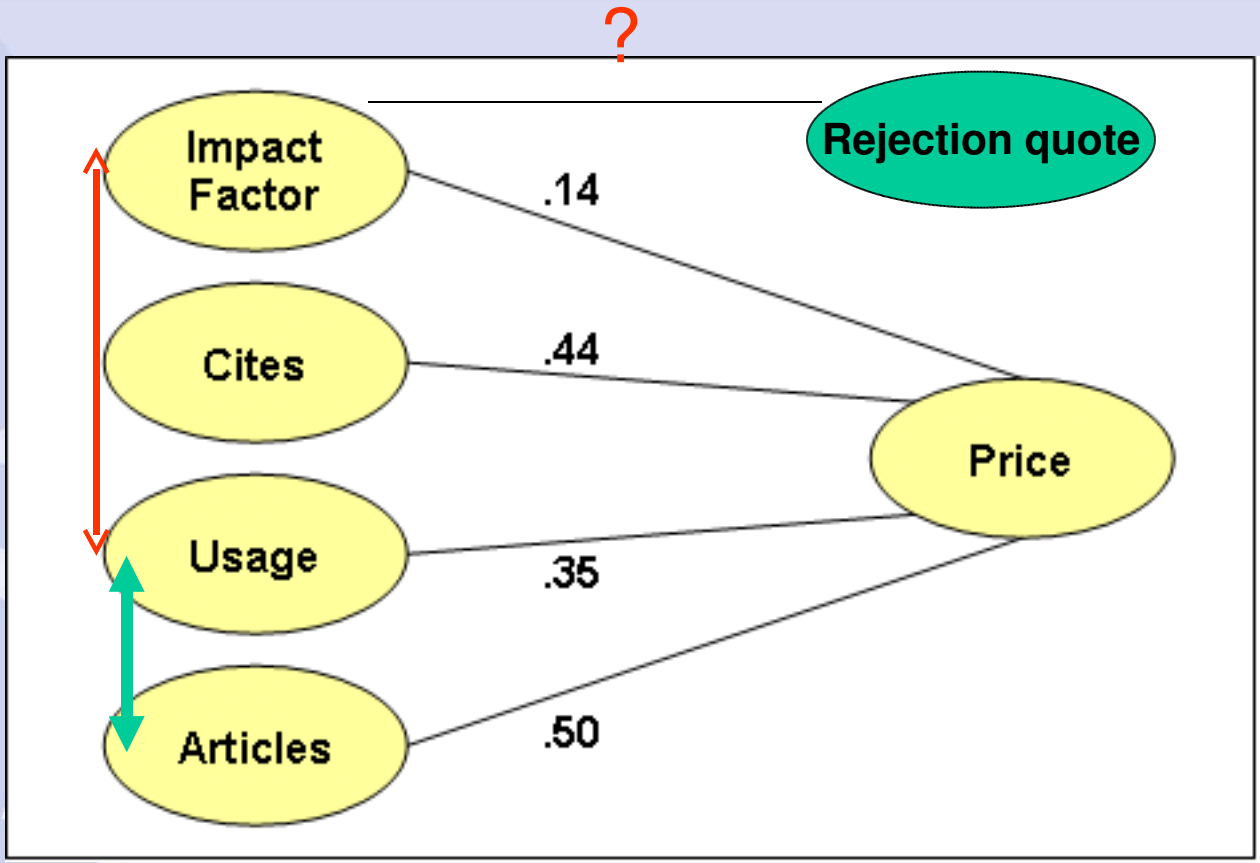


Nor concentrated on a special discipline neither publisher

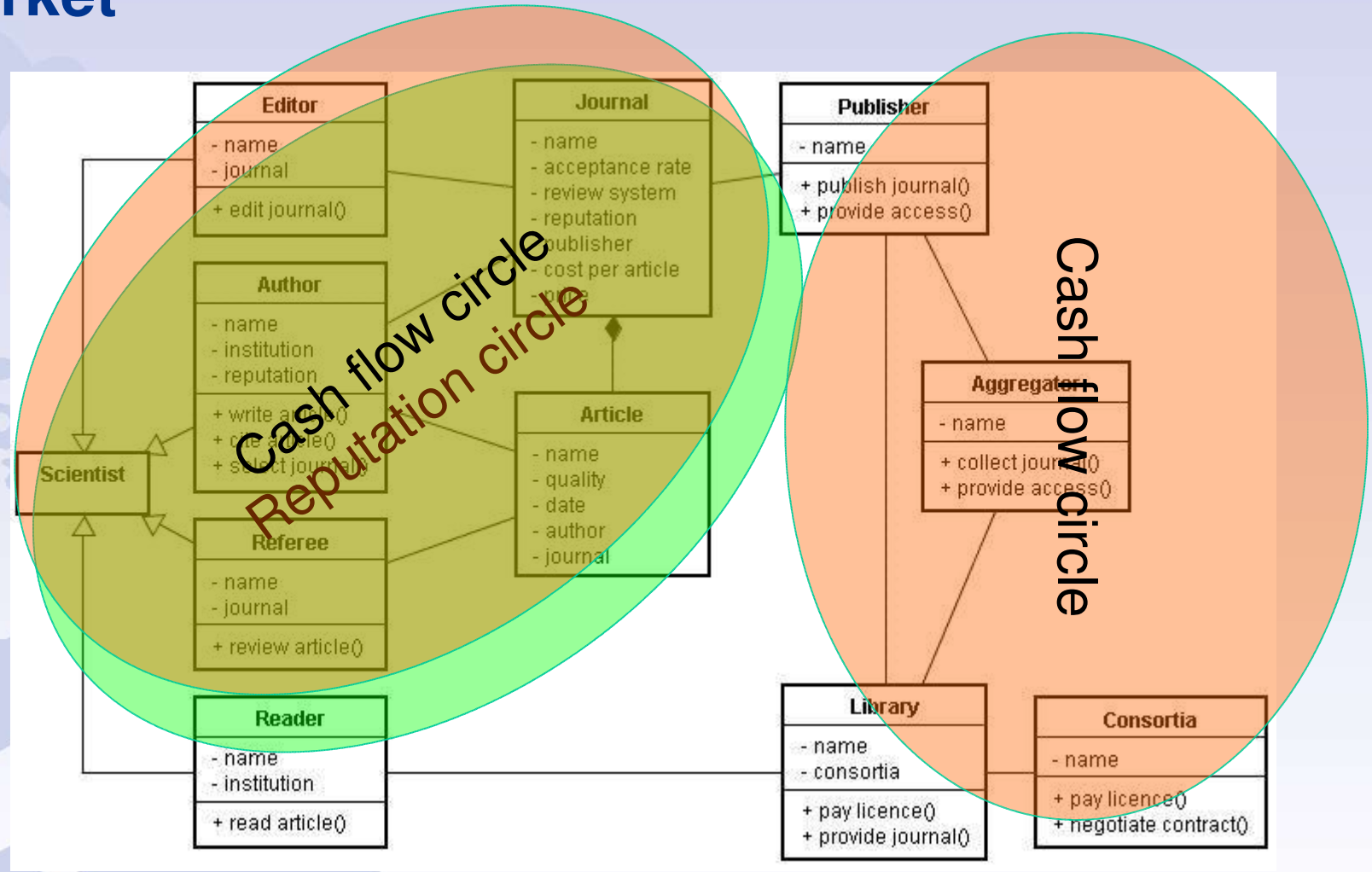
Correlation Price/Usage



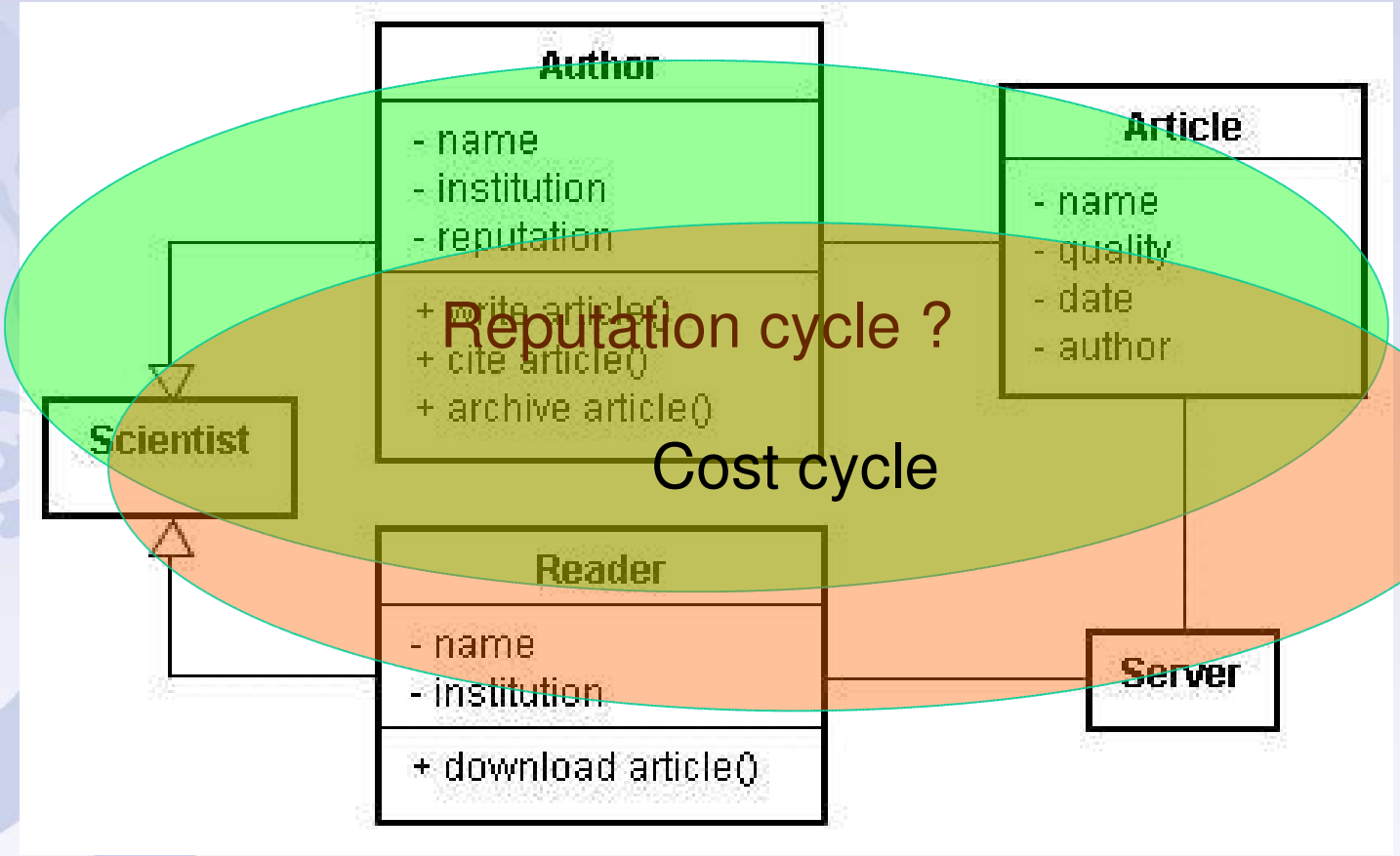
What determines the price ?



Traditional scientific journal market



Fundamental Open Access



self sufficient ?

Modelling the reputation cycle: Authors

$$r_{i,t} = \frac{\sum_{a=1}^{A}\sum_{j=1}^{J}\sum_{\tau=t-f}^{t-1}\left[x_{a,i}\cdot y_{a,j,\tau}\cdot r_{j,t}\cdot(1-\theta)^{t-\tau}\right]}{\sum_{a=1}^{A}\sum_{j=1}^{J}\sum_{\tau=t-f}^{t-1}\left(x_{a,i}\cdot y_{a,j,\tau}\right)}$$

Retardation elements considering the past

where

$$x_{a,i} = \begin{cases} 1 & \text{if article a is written by author i} \\ 0 & \text{else} \end{cases}$$

$$y_{a,j,t} = \begin{cases} 1 & \text{if article a in journal j is published at the time t} \\ 0 & \text{else} \end{cases}$$

Modelling the Reputation Cycle: Journals

$$p_{a,j,t}(q_a, q_{j,t}) = 1 - \frac{(1-\tilde{p}_j)}{(q_a - q_{j,t})+1} \quad , \text{if } q_a > q_{j,t}$$

$$p_{a,j,t}(q_a, q_{j,t}) = \tilde{p}_j \quad , \text{if } q_a = q_{j,t}$$

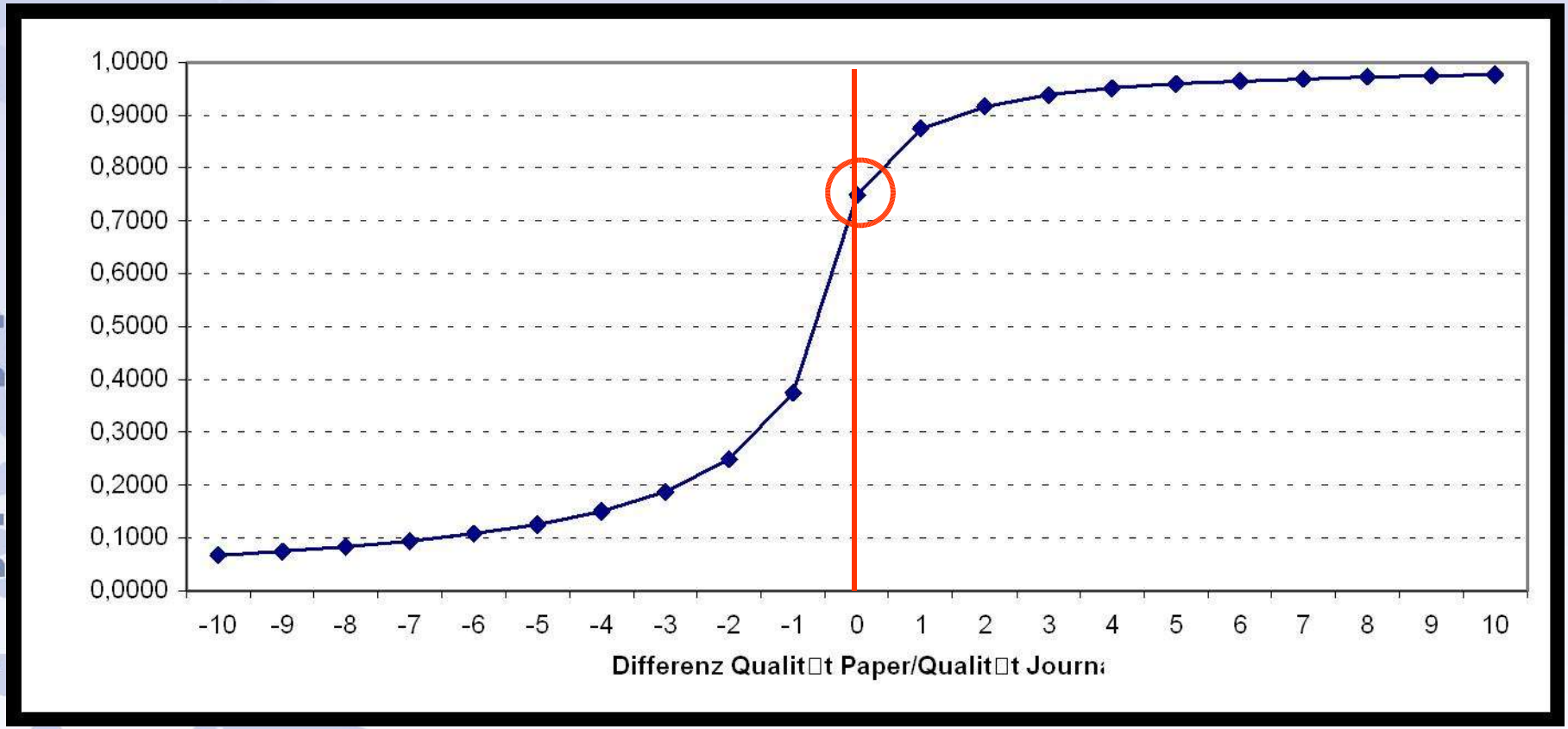
$$p_{a,j,t}(q_a, q_{j,t}) = \frac{\tilde{p}_j}{(q_{j,t} - q_a)+1} \quad , \text{if } q_a < q_{j,t}$$

q_a Quality article

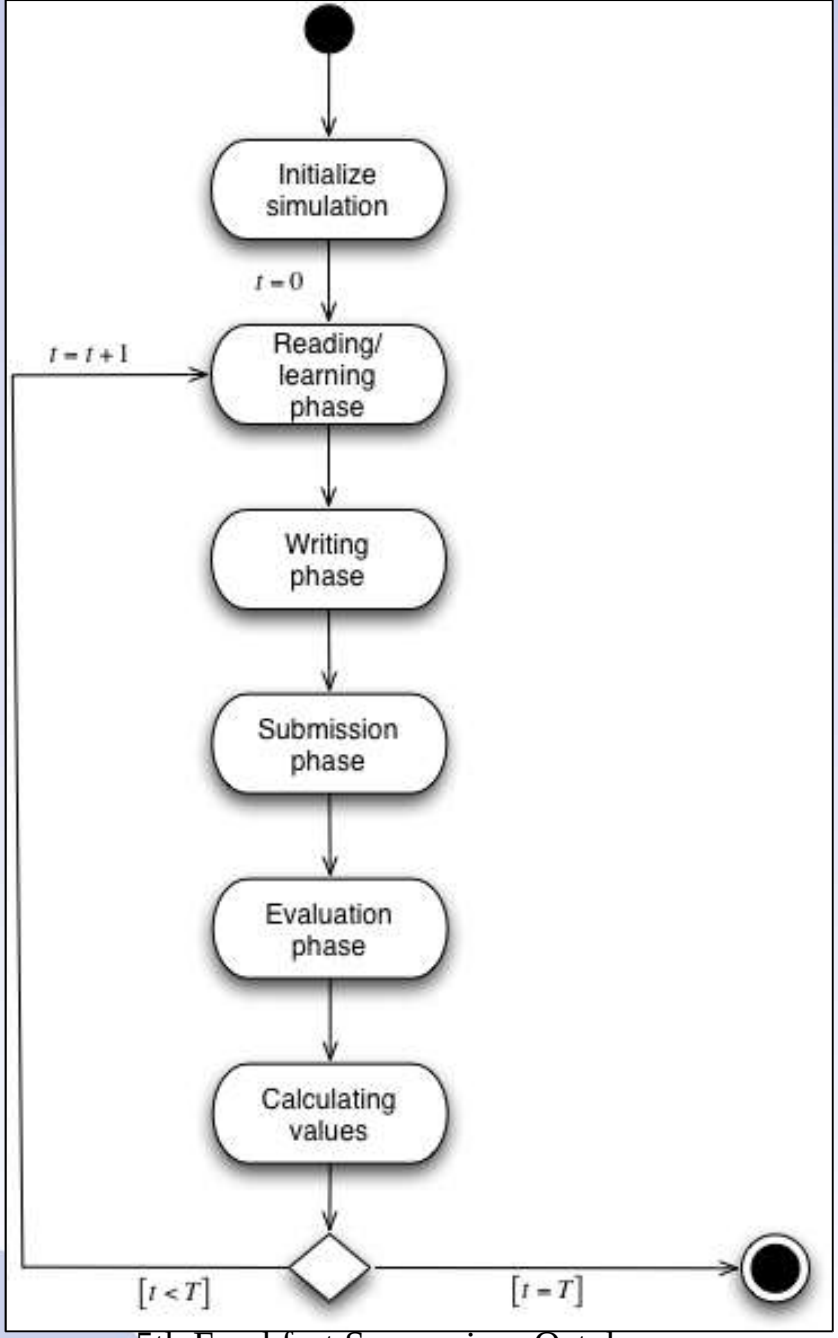
$q_{j;t}$ Quality journal

$p_{a,j,t}$ = probability of acceptance of article a in journal j at time t

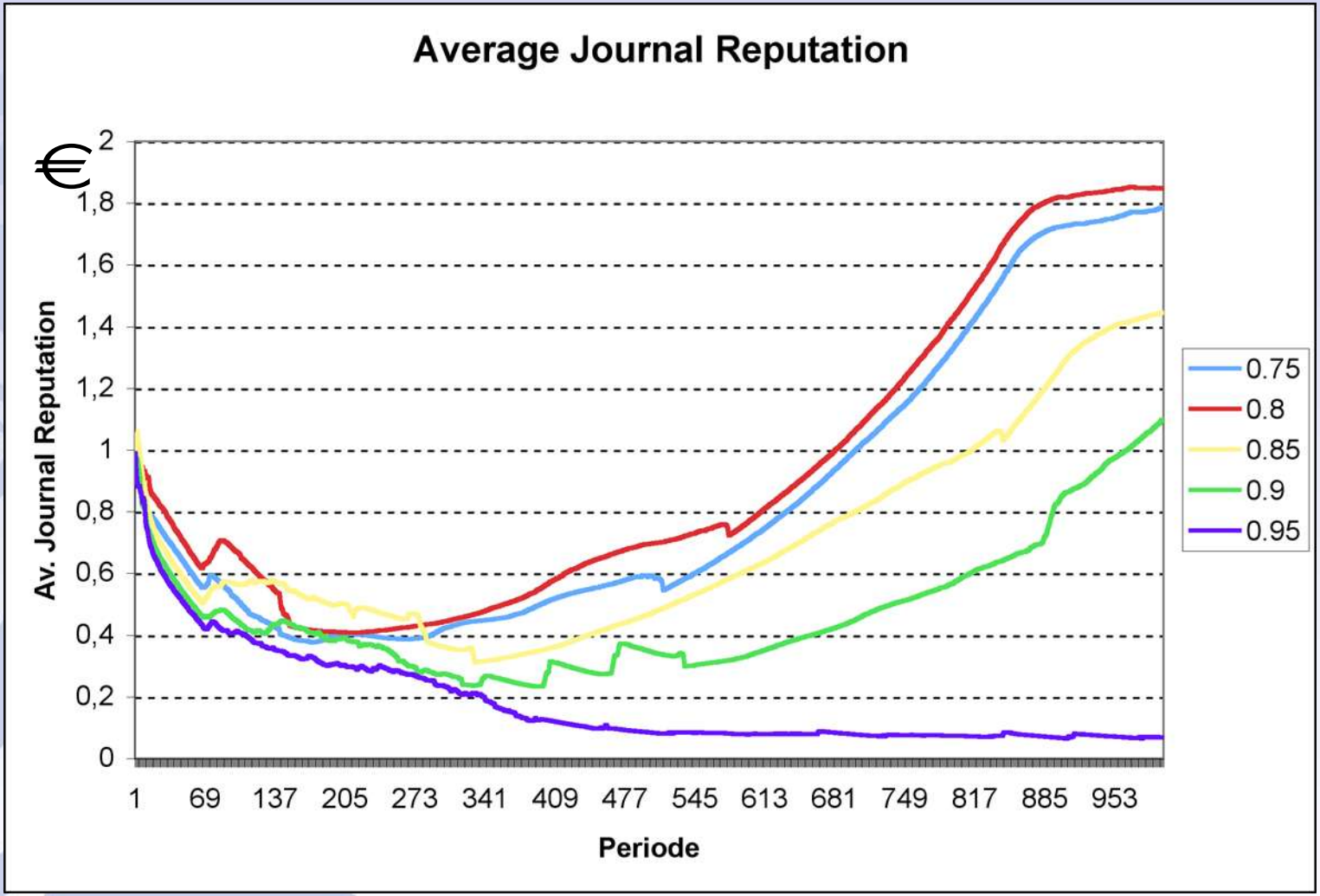
Probability of Acceptance of an Article



Simulation process



Variation of $(\tilde{p})$



Authors‘ objectives are to maximize reputation

$$\max E(p_{a,j,t}, r_{j,t}, x_{a,i}) = \max\left\{x_{a,i} * p_{a,j,t} * r_{j,t}\right\} \quad \forall a = 1 \ldots A; j = 1 \ldots J$$

For most institutional repositories $r_{j,t}$ *is (still) near zero*

Example: If $r_{j,t} = 10$; $r_{ir,t} = 0.1$; than for a given article a max E for ir is only higher, when $p_{a,j,t} < 0.01$

What follows for institutional repositories ?

The necessity of having authors with a high $r_{i,t}$

$$r_{i,t} = \frac{\sum_{a=1}^{A}\sum_{j=1}^{J}\sum_{\tau=t-f}^{t-1}\left[x_{a,i}\cdot y_{a,j,\tau}\cdot r_{j,t}\cdot(1-\theta)^{t-\tau}\right]}{\sum_{a=1}^{A}\sum_{j=1}^{J}\sum_{\tau=t-f}^{t-1}\left(x_{a,i}\cdot y_{a,j,\tau}\right)}$$

where

$$x_{a,i} = \begin{cases} 1 & \text{if article a is written by author i} \\ 0 & \text{else} \end{cases}$$

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JOHANN WOLFGANG GOETHE
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FRANKFURT AM MAIN

For more information:

Please contact:

- **Berndt Dugall** (b.dugall@ub.uni-frankfurt.de)

or

DFG-Project: Perspectives for the purchase of electronic information resources in Germany

- **Rainer B. Fladung** (rfladung@wiwi.uni-frankfurt.de)

DFG-Project „Scientific Publishing and Alternative Pricing Mechanisms“

- **Dr. Matthias Hanauske** (hanauske@wiwi.uni-frankfurt.de)
- **Steffen Bernius** (bernius@wiwi.uni-frankfurt.de)